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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,279	07/25/2003	Richard B. Zeng	10971278-3	4245

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EXAMINER

DO, CHAT C

ART UNIT PAPER NUMBER

2124

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,279

Applicant(s)

ZENG, RICHARD B.

Examiner

Chat C. Do

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/25/03; 11/17/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/17/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: the applicant is advised to update information cited in the "cross-reference to related applications" section of the present application.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4 and 7-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Hesson (U.S. 5,121,352).

Re claim 1, Hesson discloses in Figures 1-3 and 9 a multiplier (abstract and title) comprising: means (Figure 12A) for receiving at least two operands, A and B (in this case, A and B are X and Y respectively); means (10 and 11 in Figure 12A) for generating a product of at least two operands (Figure 3d), wherein generating means is arranged to enable both signed and unsigned multiplication (abstract lines 1-2); and wherein means for generating implements a modified Baugh-Wooley algorithm for signed multiplication

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that generates a product of operands A and B according to $((S_A * S_B * 2^{2N-2}) + (S_A * (-1) * 2^{N-1} * B') + (S_B * (-1) * 2^{N-1} * A') + (A' * B'))$ wherein N is the number of bits in each operand, S_A is the sign bit for operand A, S_B is the sign bit for operand B, A' is the bits of operand A excluding its sign bit, and B' is the bits of operand B excluding its sign bit (this expression is exactly same as the expression P_{tc} in Figure 3a wherein $m = n$).

Re claim 2, Hesson further discloses in Figures 1-3 and 9 a means for generating is further configured to perform unsigned multiplication (abstract lines 1-2) by generating a product of operands A and B : according to: $((S_A * S_B * 2^{2N-2}) + (S_A * 2^{N-1} * B') + (S_B * 2^{N-1} * A') + (A' * B'))$ (this expression is exactly same as the expression P_{uns} in Figure 3b wherein $m = n$).

Re claim 3, Hesson further discloses the modified Baugh-Wooley algorithm translates a signed operand to an unsigned operand (Figures 3).

Re claim 4, Hesson further discloses generating means is implemented having a static design (Figure 12A).

Re claim 7, Hesson further discloses means for identifying whether signed or unsigned multiplication is desired (Figures 3a-3d and Figure 12A as Control).

Re claim 8, it is system claim of claim 2. Thus, claim 8 is also rejected under the same rationale as cited in the rejection of rejected claim 2.

Re claim 9, Hesson further discloses in Figures 1-3 and 9 at least one processor (Figure 12c).

Re claim 10, Hesson further discloses in Figures 1-3 and 9 linear summation array is implemented as an even-and-odd structure having a static design (col. 7 lines 1-8).

Re claim 11, Hesson further discloses in Figures 1-3 and 9 the resulting columns of linear summation array correspond to the input pitch of the operands input to the multiplier (e.g. Figures 8a and 9a).

Re claim 12, Hesson further discloses in Figures 1-3 and 9 two operands having 16 bits each are input to the multiplier (e.g. Figure 8a wherein each operand is 16 bits instead of 8 bits), linear summation array resulting for two operands having size 16 by 14 (inherently given that each adder in the Wallace tree is 2:1 therefore, it needs only 14 layers of adder to sum up 15 rows).

Re claim 13, it is method claim of claim 8. Thus, claim 13 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 14, Hesson further discloses in Figures 1-3 and 9 using a common set of computational resources for computing the product of operands A and B for both signed and unsigned multiplication (abstract lines 1-2 and control in Figure 12A).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being obvious over Hesson (U.S. 5,121,352) in view of the admitted prior art.

Re claim 5, Hesson does not disclose in Figures 1-3 and 9 a multiplier is operable at a frequency of 1 GHz or greater. However, the admitted prior art discloses a multiplier circuit operates at a frequency of 1GHz or higher in the background section of the application (lines 6-8 page 1). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to operate the multiplier at 1 GHz or higher because it would enable to improve the system performance by producing the result much faster.

6. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being obvious over Hesson (U.S. 5,121,352) in view of Kuroda et al. (U.S. 4,989,168).

Re claim 6, Hesson discloses in Figures 1-3 and 9 a multiplier is operable to perform multiplication when multiplication is enabled for multiplier. Hesson does not disclose in Figures 1-3 and 9 the multiplier is operable to perform population count for a received operand when population count is enabled for multiplier. However, Kuroda et al. disclose a population count function (abstract) using a multiplying unit. Therefore, it would have been obvious to a person having ordinary skill in the art to add a population count function using the multiplying unit as seen in Kuroda's invention into Hesson's invention because it would enable to reduce the circuitry and increase the flexibility by having a population count function utilizing the multiplying unit.

Re claim 15, it is method claim of claim 6. Thus, claim 15 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. U.S. Patent No. 5,541,865 to Ashkenazi discloses a method and apparatus for performing a population count operation.
- b. U.S. Patent No. 6,369,610 to Cheung et al. disclose a reconfigurable multiplier array.
- c. U.S. Patent No. 5,956,265 to Lewis discloses a Boolean digital multiplier.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (703) 305-5655. The examiner can normally be reached on M => F from 7:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (703) 305-9662. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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September 23, 2004

Kakali Chakraborty

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